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PROGRESS REPORT ON THE NEW GES AND CANAL PROJECTS IN THE USSR

[Numbers in parentheses refer to appended sources.]

The scientists of the USSR continue to give their assistance in solving various problems which constantly arise in connection with the preparation of the big construction projects. In the meeting of the Academy of Sciences USSR on 3 - 5 July, a number of scientists discussed the all-important question concerning the amount of water which will pass through the proposed dams at Kuybyshev, Stalingrad, Tsimlyanskaya, and Kakhovka during the springtime floods. Data for the last 70 years on the rivers involved was taken into consideration before arriving at a decision. The safety of the dams and the construction costs, as well as the time required for their completion, will depend on the correctness of the decision taken. (1)

Soviet engineers have worked out several original designs for hydroelectric power plants suitable for large rivers flowing through flat country. One of them, which is adopted for the Kuybyshev and Stalingrad GES constructions, does away partially with the spillway in the dam. According to this design, the surplus water is led through conduits to join the tailrace of the turbines in such a way that its flow acts as an ejector and thus helps to keep the pressure up in the turbines during the springtime floods when the head is reduced by the high level of the tail waters. Moreover, the design lowers considerably the construction costs of the dam. (2)

Measures are being taken by the government to prevent a shortage of specialists for the constructions during the coming 5-6 years when a great army of highly specialized workers, engineers, technicians, and others will be needed to carry out the task. As the majority of the engineers needed must be specialists in hydraulics, the enrollment of students into hydraulic-engineering institutes, water-resources development institutes, and respective faculties of other universities is sharply increasing for the 1951-1952 school year. Furthermore, many schools and faculties teaching other specialties are changing their programs to hydraulic engineering and water-resources development. (3)

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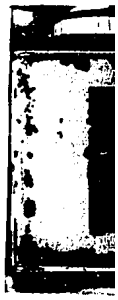
It was reported that one kilowatt of the electric power produced by a hydroelectric station in USSR, is three times cheaper than that produced by a steam-electric power station. (4) Furthermore, it was pointed out that to produce by means of heat the total annual output of the Kuybyshev and Stalingrad hydroelectric power stations 20,000 trainloads of coal would be required. Consequently, the turbines turned by the waters of the Volga, Dnepr, Don, and Amu-Dar'ya rivers will save 50 million tons of coal annually for the Soviet Union. (5)



Volga-Don Canal

Of the new projects, the Volga-Don Canal and Tsimlyanskaya GES are in the most advanced stage of construction, and the builders have pledged to start filling the canal and the Karpovskiy water reservoir with the waters of the Don River on 1 February 1952. (6) The work on the canal is proceeding 24 hours a day along its entire length of 101 kilometers, of which 56 kilometers are the canal proper and 45 kilometers are the combined length of three reservoirs, Karpovskiye, Bereslavskiye, and Varvarovskiye. A 114-kilometer-long highway has been completed along the canal, and 17 workers' settlements with a total living space of 75,000 square meters have been built along the road. (7)

Although some of the numerous excavators now employed, especially the ESH-1 type walking excavators, do not fulfill their norms, owing to frequent breakdowns and absence of spare parts, (8) the work on the canal, by the end of the first half of 1951, had progressed to such an extent that concreting had begun on lock No 13 and was under way in all the locks in July. The piece-work system was introduced to expedite concreting lock No 10 and the pumping station. (9) Concreting of the bottom of lock No 1 was completed on June 16. It took slightly over one month to do the job, whereas on locks No 3, 10, and 13 it took from 4 to 7 months each. (10) In August, the excavation work in the section of the canal between lock No 10 and No 11 was nearing completion, (11) and excavation for lock No 7, which was delayed by the excessive amount of ground waters present, was at last completed. It took 22 powerful water pumps working constantly to keep the level of the ground water down. (12)

On August 14th, it was reported that the dams across the valley of the Chervlenaya River, which will create the Bereslavskiye and Varvarovskiye water reservoirs, have been built. (13) The Bereslavskiye, Varvarovskiye, and Karpovskiye artificial lakes will occupy 100 square kilometers and contain 400 million cubic meters of water (7) for feeding into the sluices of the canal and for irrigation purposes. (13) Several hundred fitters and assemblers of the "Gidromontazh" Trust have already commenced their work of assembling various equipment to be installed on the canal, including the gates of the locks, etc. At the peak of this work, over 1,500 men will be occupied in this kind of work. (14) At the entrance of the canal into the Bereslavskiy reservoir, gigantic steel emergency gates have been installed. About 370 tons of metallic parts had to be assembled to complete the job, (15) concrete work for the gate having been completed previously. (16) Other complicated equipment, water tubes, gates weighing 100 tons each, (17) and pumps for pumping station No 31 which will supply water from the Don River into Karpovskiye water reservoir were being installed in August. (18)

Tsimlyanskaya GES

The work is progressing rapidly. Placing the gravel cushion on the bottom of the Don River, under the earthen part of the dam, was completed prior to June, (19) and placing stones on top of it was completed in July when the stone dam was 3 meters above the water level in the river. At present, sand is being dredged on top of it. A 100-meter-wide gap is left in the dam near the right

bank of the river to be closed in September when the concrete spillway of the dam will be completed, thus making it possible to divert the waters of the Don River into the spillway. (20) On 5 August, it was reported that the 400-meter long section of the dam, adjacent to the right bank of the river, has already reached its projected height of 38 meters. Construction of the reinforced-concrete part of the dam and the power station proper is progressing rapidly also. Early in August, it was reported that concreting of the two lower sections of the concrete dam have been completed, and the work was under way on the upper section (the 3d) at a rate of placing 6,000 cubic meters of concrete each 24-hour day. (21)

As for the power station proper, it was expected to have the base ready by June for the first turbine stator to be installed. (14) In June, the upper sections of the structure (the 4th and 5th) were being concreted (22), and in August, the work progressed to such an extent that placing tiles of the exterior finish of the building has commenced, and 400 square meters of the tile placing had been completed. (21) Construction work on the port within the Tsimlyanskoye Sea, where both sea-going and river boats will be accommodated, was under way day and night. Sheetpiles were being driven into the ground to form a pier 500 meters long and 150 meters wide and connected with the shore by an earthen dam. The dam, when complete, will have a railroad and highway on top of it. (23) Concreting lock No 14 having been completed, the upper and lower gates of it were assembled and installed in July, and the work on lock No 15 was also in progress. (24)

Moving the Tsimlyanskaya settlement (stanitsa) and 28 other stanitsas and villages from the territory to be flooded by the waters of the proposed Tsimlyanskiy reservoir was completed in July. The moved inhabitants were consolidated into 11 newly organized settlements. (25) Construction of the dam to protect the city of Kalach from flooding when the level of the Don will rise 7 or 8 meters as a result of building the Tsimlyanskaya Dam is nearing completion. (26)

All kinds of equipment, machinery, and parts for lock-operating mechanisms and equipment for the GES proper have been arriving at the construction site of the Tsimlyanskaya hydroelectric center. Big parts of the first hydrogenerator, manufactured and shipped by the Leningrad Plant "Electrosila", (27) loaded on 26 railroad cars, were received and unloaded. (28) The second hydrogenerator was also completed at the "Electrosila" Plant on 31 July, (26) and the third one was finished in September. The Stalin Metal Plant of Leningrad has already completed manufacturing the second turbine and expects to have the third one ready by September. (29) The Moscow "Dinamo" Plant has designed and constructed the main remote-control panel to operate electrically various mechanisms of the locks of the Volga-Don Canal. The control board is the push-button type and is operated by one person. (30) The plant had already shipped five of these panels to the construction site and was about to ship the sixth and seventh ones in August. (31) Other electrical gadgets for automatic control of the water level in the locks and other precision instruments which are parts of the automatic control system have been manufactured by the "Tochelektropribor" Plant in Kiev. (30)

Construction of the entrance into the Main Don Irrigation Canal from the Tsimlyanskiy reservoir reached the stage of placing concrete. (32) Boring of the first tunnel, 6 kilometers long, in the Sal'skaya steppe through which the canal will pass, was in progress in July by personnel of the Moscow and Leningrad subway builders, experienced in this kind of work. The work, on which much mechanized equipment is used, proceeded 24 hours a day. (33) Instead of one tunnel, as originally planned, four tunnels, 50 meters apart, will be bored, and it is expected that the first one will be in operation by spring 1952. (34) On 14 August, the first kilometer of the tunnel was completed, and the brigades of workmen boring the tunnel have pledged to increase their output to one meter per day. (35)

On the Nizhne-Donskoy Canal (Lower Don Canal), excavators are working over two thirds of the total length of the canal, and some sections of it have been completed in all details. (36) The Veselovskaya irrigation section of the Volga-Don Canal System was put into operation a year ahead of schedule. The water fed by the Veselovskaya reservoir already irrigates the "Iskra" and "Zavety Il'icha" kolkhozes. (37)

Kuybyshev GES

During 1951, the work on the Kuybyshev GES was confined mainly to extensive excavating, building auxiliary enterprises, railroads, highways, and a considerable number of dwellings and other communal buildings. (38) On 21 August, N. Shaposhnikov, chief engineer of "Kuybyshevgidrostroy," claimed that the plan for the first half of 1951 was exceeded. (39) I. Komzin, chief of "Kuybyshevgidrostroy," in his article on the occasion of the first anniversary of the announcement of construction, pointed out that the basic objectives to be completed during the remainder of 1951 were as follows:

1. To speed up the work on the coffer dams and expedite excavation on both sides of the river. To carry this out, 11 powerful excavators must be put into operation in August on the right bank of the river, and roads must be built to insure the use of trucks and other motor equipment in all seasons and weather conditions.

2. Before the cold season sets in, to deposit 1.7 million cubic meters of sand along the two cofferdams, using pneumatic dredgers, and to complete excavation in November for the lower lock of the navigable canal on the left bank of the river.

3. To complete the remaining 65,000 square meters of planned housing and public-utility buildings in the settlements near Stavropol', Zhigulevsk, Morkvashi, Kuneyevka, and others. (40)

The GES itself will be located on the right bank of the Volga River, near the city of Zhigulevsk. About one third of the length of the structure will be on the bank of the river and two thirds of it in the river. Adjacent to it, the earthen portion of the dam, then the concrete spillway, and, finally, next to the left bank of the river, the navigable canal with its system of locks will be built. The total length of the dam will be 6 kilometers and its height, 47 meters. (41) The dam will rest on a clay cushion instead of rocks, a method without precedent in the world history of dam building. As there is a thick layer of porous sand on top of the clay, there are two alternatives: to build the dam on top of the sand, or to remove it. In the latter case, millions of cubic meters of sand will have to be excavated. The Creative Brigade of the Builders Association which is investigating this matter has to give its answer to this question before the work on the dam will commence. (42)

Construction of the power-station building is entrusted to the right-bank construction sector, with its center in the city of Zhigulevsk, while the left-bank construction sector, with its center in the new city of Komsomol'sk-on-Volga, is responsible for building the concrete spillway and the navigable canal with its sluices. (41) At the point where the dam will be constructed, the river is one kilometer wide, but during springtime floods, it becomes 5-6 kilometers wide, and its waters rise 12-16 meters above normal. (43) Actual work on the right bank of the Volga commenced in January 1951; at that time, stones were placed on the river bottom, through holes cut in the ice, to form a base for support of the cofferdam which was to be built around the excavation for the power-station building. Stones quarried from the nearby Mogutnaya Mountain were used, and by working day and night, the 270-meter-long base,

12-14 meters above the river bottom, was completed in March. By the end of the month, three pipelines, ½ meter in diameter each, were lowered to the bottom of the river. They are to be used in the future by the pneumatic dredgers to pump the sand excavated near the left bank of the river for constructing the cofferdam at its right bank. (41)

The 270-meter-long stone base which was under water became exposed for its entire length in August 1951, when the water level in the river became rather low. Driving 20-meter-long sheet piling into the bottom of the river was in progress along the stone base. (39) The sheet piling will form a semicircular cofferdam, about 1.5 kilometers long, to partition off and dry the portion of the river bed where a section of the power-station building will stand. (44) The excavation for the building will be 40 meters deep, and 7 million cubic meters of earth will have to be removed. It is planned to complete this work in 1952, and subsequently concreting of the foundation will commence. Powerful electric-motor-driven excavators have been at work day and night on the dry bank of the river and have removed 750,000 cubic meters of earth. (41)

However, it was reported that as late as in June, some excavators had been idle for 6 months due to the absence of electric power lines, (45) and that the first walking excavator arrived on the job only in July 1951. (46) To remedy the situation, construction of high-tension transmission lines to bring electric power to the site from Kuybyshev and Syzran' has been rushed, and the erection of steel towers began in July. (47) The two transmission lines, with a total length of 200 kilometers, will join over the Volga at the construction site, forming a single-network system. (41) The 100-kilometer-long line on the left bank of the river was completed on 24 August. (48) On the river, two dredgers have been busy during the summer deepening the bottom of the river inside the proposed cofferdam and have removed 350,000 cubic meters of earth. (41)

At the left-bank construction sector, excavation work for the lower lock of the navigable canal near Zelenovka village was started on 10 July 1951. Eleven thousand tons of steel sheet piling will be used for the cofferdam, 4 kilometers long and 15 meters high, which has to be built to keep the waters of the Volga away before excavation can be undertaken. (40) In August, there were four powerful excavators, two scrapers, seven bulldozers, and quite a number of trucks on the job. Besides that, the construction site was being cleared of trees and brush. (49)

Other activities on the left-bank construction sector include the building of the new city of Komsomol'sk on Volga, where tens of buildings for the construction workers and their families and a club have already been completed, a water system constructed, and school buildings are being rushed to be finished before the school year starts. Also under construction are concrete-mixing plants, machinery plants, a transformer substation, and garages and warehouses. Various sections of the construction are scattered for tens of kilometers along the left bank of the river, extending as far as Stavropol' upstream and Kuybyshev downstream. (41)

Although the Kuybyshev branch construction administration of the Main Administration for Construction of Railroads of the East, which is in charge of construction of railroads leading to the GES, fulfilled its plan for the first quarter only by 55.9 percent, (50) the first train arrived at Zhigulevsk from Syzran' on 24 June, and it is expected that the other railroad now under construction along the left bank of the river from Kuybyshev to the site will be completed on 7 November. (36)

A new highway is under construction between Kuybyshev and the builders' city. (51) Construction of a new permanent river port has begun in the vicinity of Mor'kvashi village on the right bank of the Volga. A railroad is being built to connect the port with the Otvazhnoye railroad station. (52)

Upon completion of these ways of transportation, the flow of materials and equipment for the construction will be routed through four channels, namely the railroad line from Syzran', the railroad line and highway from Kuybyshev, and the Volga River. (41) In this connection, it should be noted that during the year of preliminary work, 1.5 million tons of various freight were received and used at the construction site, 800 large barges and 12,000 railroad cars were unloaded, and 450,000 cubic meters of lumber were utilized. It is expected that during the coming years of construction, 40 million tons of freight will have to be delivered and absorbed. (40) It is estimated that the following materials will be required to complete the whole project: lumber, 2,200,000 cubic meters; cement, 2,160,000 tons; metals, 700,000 tons; stone materials, 4,500,000 cubic meters; and ballast, 8 million cubic meters.

The scope of work will include: excavating earth, 92 million cubic meters; filling in earth, 47 million cubic meters; placing concrete, 5,900,000 cubic meters; masonry, 3,100,000 cubic meters; and filling in stones, 3,300,000 cubic meters. (53)

The main office of the "Kuybyshevgidrostroy" has received 33,000 applications for jobs on the construction of the GES. Many unskilled kolkhoz workers who have joined the ranks of builders at different times, now are skilled operators of machinery or have learned other trades. The training combine which was created on the site has produced a great number of skilled specialists. In September, it is planned to open night classes in the newly opened branch of the Industrial Institute and Hydraulic Engineering Technicum. In addition, the kolkhoz workers of the Volga region completed over 300,000 cubic meters of earthen works during the construction of the railroads. (54)

The proposed location of the Kuybyshev-Moscow high-tension transmission line of 400,000 volts was surveyed during the summer by the expedition which was dispatched in spring 1951 by the "Teploelektroproyekt" State Planning Institute. The expedition, headed by G. B. Poppel', completed its survey of the first 200 kilometers of the line by July. (55)

Stalingrad GES

It has been definitely decided that the dam of the Stalingrad GES will be over 5 kilometers long, 45 meters high, and 450 meters wide at its base. (56) It will be built across the river near the small village of Rynok where the Volga is narrow and has a sandy island in mid-stream.

A double-track railroad line and a highway will be built on top of the dam. (57) The GES building will be 500 meters long and will house 17 gigantic turbogenerators. (56) The concrete spillway, the GES building itself, and the locks of the navigable canal will be built near the left bank of the river, near the point where the Akhtuba branch of the Volga leaves the main stream of the river. Consequently, the main construction section is located on the left bank of the river, and a city to accommodate 65,000-70,000 people has been founded there. Thousands of workers and the major part of the equipment available for the construction have also been concentrated there. (58)

Excavation for the foundations of the above-mentioned concrete structures was to start during the second half of 1951 (57), but it was delayed because of the total absence of electric power supply at the main construction site. The two power stations, mounted on railroad trains (58), one of 3,000-kilowatt capacity received from L'vov, and the other of 1,000-kilowatt capacity received from Odessa (16), required extensive overhauling and repairs which had not been completed by the end of August. (58) The "Stal'montazh" Trust began construction of the high-voltage transmission line across the Volga River to supply the power to the construction site. (59) But the work progressed very slowly as extensive cuttings had to be made in the forests to clear the way for the transmission lines. Also,

concreting the bases of the 90-meter-high towers on both banks of the river and the delay in manufacturing the steel towers considerably complicated the matter. (58) The transmission line is to be 30 kilometers long, with a 1,300-meter span suspended across the Volga River. (60)

On 12 May, it was reported that the GES construction was already experiencing difficulties in obtaining stones and bricks, although construction work had scarcely started. V. Bannikov, deputy chief of the "Stalingradgidrostroy," estimates that among other materials the construction will require 11 or 12 million cubic meters of sand, over 300 million silicate bricks, 60 million red bricks, and 80,000 tons of lime. He also points out that the Ministry of Construction Materials RSFSR, which was entrusted with the task to organize a trust for creating construction materials enterprises locally, has not done anything yet. Moreover, the Ministry of Geology USSR and the Ministry of Construction Materials USSR have been cutting down for years on the volume of geological exploratory work in Stalingrad and neighboring oblasts, thus causing the present deficiency in raw-construction materials. The Stalingrad brick plants are doing a poor job supplying bricks to the construction. During the first 4 months of 1951, only 12 percent of the plan for silicate bricks was fulfilled, and delivery of red bricks has not even been started. As far as the supply of rocks is concerned, the old quarries have, in most cases, been worked out, and new and better deposits have to be found quickly and as near as possible to the main construction site. (61) There is even a shortage of sand and gravel on the job.

There is also an acute shortage of experienced hydraulic engineers and technicians to direct the jobs. (62) Most of the several thousand workers are Komsomol members who were sent by Stalingrad Komsomol organizations. (63) During the last 6 months, 2,280 persons were trained and became skilled operators of excavators, scrapers, and other machinery. A technicum which will start on 1 September is to train 300 technicians. (60)

On 31 August, the first anniversary of the announcement of the Stalingrad GES project, F. Loginov, the construction chief, reported that the whole year was spent with preliminary work and preparation of material bases at the construction sites on both banks of the Volga. Along both banks of the river, auxiliary enterprises such as a machinery plant, a woodworking plant, automobile-repair plants, and other repair shops are now under construction. The large machinery plant will be partially in operation in 1951 and will repair excavators, tractors, scrapers, and other machinery. Its capacity will be large enough to overhaul completely 2,000 trucks per year. The woodworking combine will be able to process 3,000 cubic meters of lumber.

On the left side of the river, a highway now under construction is to connect the construction site with the auxiliary enterprises, railroad stations, river ports, and warehouses. Another highway is under construction on the right bank of the river, and 8 kilometers of the road have already been completed. In addition, three railroad spurs and the Spartanovka railroad station, (58) as well as a 9-kilometer-long railroad line to connect the left bank construction site with the system of the Ryazan'-Ural Railroad were completed. (60)

Loginov further said that the plan up to 1 September 1951 was exceeded, and it is expected that its equivalent will be carried out during the remaining months of 1951 by applying Stakhanovite and socialist competition methods under party supervision. During the 4 months, it will be necessary to complete the high-voltage transmission line and make electric power available on the site; to complete the water system and heating plants in the city of the builders and put into operation 300,000 square meters of housing, to build transportation facilities, (58) including 43 kilometers of railroads and highways, (60) and to alleviate shortage of skilled personnel. (58)

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The Volga-Ural Canal

In June, excavation work on a small scale started at the Volga end of the canal. (62) A party of geologists have completed the survey for the first 70 kilometers of the canal. (64)

The 650-kilometer-long canal will begin at a point where the Osadnaya Balka Ravine comes to the Volga River, and the ravine, which is 15 kilometers long, will be the first part of the canal. The canal will run south, parallel to Akhtuba for some distance, then turn east and pass near the Saykhin station of the Astrakhan'-Saratov railroad, which is 250 kilometers east of the Volga. From Saykhin the canal will run in a northeastern direction, by-pass the Gor'kaya River with its salty marshes, and then turn southeast and run for about 100 kilometers to the Urda rayon center which is surrounded by sands. Here, the canal will make a 90-degree turn, run northeast again, pass over 50 kilometers of sand, and come near a large salt water lake, Aral Sor. Here, the canal will make a wide detour to the north, and its bed will be elevated to avoid salt contamination. This will require bringing considerable amount of earth from a distance of tens of kilometers. The canal will cross several rivers, including Malyy Uzen', Bol'shoy Uzen', and Kushum, and this will require the building of aqueducts and dams. Further, the canal will lead about 30 kilometers south of Fumanov village into Dzhangalinskiy and Taypakskiy rayons. From Karmanovka village, which is on the Et-Batyr Lake at the mouth of Kushum River, the canal will run for 100 kilometers across uninhabited land and then emerge at the bank of the Ural River, a few kilometers north of the rayon center of Kalmykovo. (65)

Main Turkmen Canal

It is planned to build the Main Turkmen Canal at least 100 meters wide and deep enough for navigation. At first, the canal will be dug in a much smaller cross section and filled with water. Then, it will be enlarged to its full dimensions by pneumatic dredging. It is expected that the enormous amount of silt brought into the canal by the water of the Amu-Dar'ya will render the bottom and walls of the canal waterproof, thus preventing serious loss of water by ground seepage. (66) To have cheap electric power available for the construction of the project, one of the hydroelectric power stations planned on the canal will be built first. (67) It is also planned to lay 1,000 kilometers of pipelines to supply water from the canal to the industries in Krasnovodsk, the chemical industries in Kara-Bogaz-Gol, the petroleum fields of Nebit-Dag, Dzhebel, and Chelken, the sulfur plants in Darvaza in the center of Kara-Kum desert, and the industries of Kyzyl-Arvat and Ashkhabad. (5)

V. Eristov, chief engineer of the "Sredazgidrostroy," stated on the first anniversary of the announcement (12 September) of the canal construction, that the past year was spent in preliminary work which consisted of building auxiliary enterprises, extensive geological, topographical, physical, and other surveys, prospecting for raw construction materials, and providing means of communication around the main construction site and living facilities for the construction workers and their families. On the Takhia-Tash promontory, several large enterprises are under construction, including plants for repairing construction machinery, automobiles, tractors and a woodworking combine. A part of the latter enterprise and a diesel-driven electric power plant have been in operation since September. (67a) Besides, there are 12 portable electric power plants in operation, supplying power to the motor pool, river wharves, and dwellings. (68)

The geological survey and drilling have been under way on the entire length of the canal from Takhia-Tash to Krasnovodsk. (67a) By the end of June, after having been in the field for 6 months, Geological Engineering

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Expedition No 31 of "Gidroproyekt" completed the survey for the prospective location of the dam of the Takhia-Tash Hydroelectric Center and its report showed two location possibilities, either directly opposite the promontory or slightly downstream. (69) After completion of the above work, the expedition moved its activities into the bed of the Kuniya-Dar'ya River. (70)

The expeditions sent by the Turkmen Geological Administration in cooperation with the expeditions sent by the Academies of Sciences USSR, Turkmen SSR, and Uzbek SSR, numbering almost 800 persons formed into three parties with 42 groups, penetrated deeply into Kara-Kum Desert. Surveying the 300-kilometer-long section of the proposed canal between Malyye Barkhany and the Kurtysh-Baba well has been completed. Early in August, the first party was about to complete survey of the 150-kilometer-long section between Takhia-Tash and Uzbay. Moreover, the most difficult section between the Kurtysh-Baba well and the Charyshly well was penetrated by the drilling crews. (71)

The expedition sent by the Ministry of Geology USSR for aerial survey of 200,000 square kilometers of the canal area completed photographing 10,000 square kilometers by June. (72) The members of the surveying expeditions working in the Kara-Kum Desert under very trying desert weather conditions were without any medical service and were very poorly supplied with fresh food. (73)

As tens of millions of tons of construction materials will be needed, several expeditions have been prospecting for raw materials which could be used. (74) In June, it was reported that lightweight porous stone, limestone, clay and gypsum had been discovered, (66) and that quartz sands suitable for concrete were discovered on Tokmak-Ata Island in the Aral Sea. (75) Deposits of calcareous sandstone were found near Takhia-Tash, in the Syaur-Kala uplands, in Ketmenchi, and in other locations. Moreover, at a point about 40 kilometers southeast of Takhia-Tash, granite, marble, and quartzite have been discovered (72), and at another point near Takhia-Tash deposits of loess loams which can be used for making bricks were found. (74) In the mountains of the Sultan-Uz-Dag ridge, about 70 kilometers south of Nukus, the expedition of the Kazakh Academy of Sciences has discovered deposits of gypsum, gravel, and sand. (75) About 100 kilometers south of Takhia-Tash, unlimited quantities of rocks suitable for concreting and road building were ascertained, while in the same vicinity near the Ak-Tay Mountains, large deposits of limestone and gypsum were found.

A stone quarry with an annual output of 50,000 cubic meters of stone was put into operation in August, and another one of the same capacity was expected to be in operation within a few days. (74) The two quarries are highly mechanized and besides stones, will also produce pebbles, lime, and gypsum. (67a) Since the Kara-Kum sands are very fine they are not suitable for mixing in concrete. However, tests by scientists may reveal a possibility of using the sand in limited quantities to mix with coarse sands obtained elsewhere. (76)

The first shipments of materials and equipment arrived on the construction site in December 1950. They consisted of prefabricated houses, electric supplies, portable electric power plants, machine tools, and many other items. (67a) Altogether 1,500 carloads of freight have arrived since. (77) The freight arrives at Nukus, which is situated a few kilometers away from the Takhia-Tash promontory, the main construction site, but about 200 kilometers away from the nearest railroad. Therefore, the freight arrives by water, either from Chardzhou or from the Aral Sea. Shipping on the Amu-Dar'ya is possible only during daytime, as the navigable channel of the river changes its course within hours, thus making it hazardous to sail in darkness. (66) A railroad connecting Chardzhou with Kungrad is under construction, and the earthen work on the Novo-Urgench-Takhia-Tash railroad sector was about to be completed in September. It was expected that the railroad would be in operation by winter. (78)

Another railroad, 20 kilometers long, connecting the Khodzhelinskiy quarries with the construction site at Takhia-Tash, and railroad spurs around the site and leading to the piers on the river were under construction during this summer. (79) On 8 August, it was reported that, altogether. 1,500 kilometers of asphalt-surfaced roads will be built (67), but the roads along the canal will have to be surfaced either with concrete or silicate, as the use of asphalt is not feasible because of the high temperature of the Kara-Kum sands which reaches up to 70 degrees centigrade at midday. (66)

In Takhia-Tash, about 11,000 square meters of housing and public utility buildings have already been completed and are occupied by tenants. A building for a 7-grade primary school (78) and the water system were completed in August (80), while buildings for stores, a club, a public bath, and hospitals are under construction at present.(67a)

Many scientists of the USSR are closely cooperating with the "Sredazgidrostroy" and now are trying to solve various problems, some of which are as follows:

As an enormous quantity of sand will be required to mix 2.5 million cubic meters of concrete, and as the Kara-Kum sands are not suitable for this purpose, the Academies of Sciences USSR and Kazakh SSR are trying to find a suitable substitute. They are also working out measures to counteract the harmful effect on concrete structures by the sharp changes in temperature in the desert and the presence of saline ground waters. As one cubic meter of Amu-Dar'ya water carries 12 kilograms of sand and silt, the Academies of Sciences USSR and Uzbek SSR, in cooperation with "Gidroproyekt," are to work out practicable measures to prevent the sediments from going into the canal, and at the same time, to have the highly fertile parts of the fine silt passed through the main canal into irrigation canals.

The Academies of Sciences USSR and the Uzbek SSR, together with the "Gidroproyekt," have to decide on the most suitable rate of flow in the canal, as too much speed will hamper navigation and the upkeep of the walls of the canal. On the other hand, too slow a flow will be instrumental in silting up the canal and unduly increase construction costs, as it will necessary to build a canal of a larger cross section. As it is, the excavation is of enormous dimensions, 500 million cubic meters of earth.

Furthermore, the western part of the canal has to be earthquakeproof. The Academies of Sciences USSR and Georgian SSR are working on this problem, together with "Gidroproyekt" engineers.(67a) There is also a problem as to how to build extensive irrigation canals and, at the same time, not to raise the level of the salty ground waters in the Kara-Kalpakiya and Khorezmskiy Oasis. (81) Designs of housing and public buildings suitable to the desert climatic conditions are to be worked out. Problems as to water supply, heating and air conditioning, ice making, (67a) and utilization of solar energy (82) are now being tackled by thousands of scientists.(67a)

Kakhovka GES

During 1951, the work on the Kakhovka GES was confined to preliminary tasks, and the construction itself is to start early in 1952. The geological survey now under way must be completed in its main aspects during this year. (83) The Academy of Sciences Ukrainian SSR and its numerous scientific research institutes have already solved a considerable number of the 100 problems originally presented to them. Special expeditions working on the problems have been in the field for a year. The Hydraulics and Hydraulic Engineering Institute is now testing the theoretical calculations of the strength of the structures on the small-scale model of the GES. One of the answers so far received was that it will be feasible to build the concrete dam of the GES on a sand base to keep the cost of excavation down. (84)

As the result of the field work of topographers, geologists, architects, economists, scientists, and planners, it has been decided that the Kakhovka GES and its new city will be built in the vicinity of the Kazatskoye village and Khuchevaya village respectively. All the auxiliary enterprises will be located around the city. (83) The Ukrainian State City Planning Institute has completed the basic projects for the cities to be built in the area of the future GES and the South Ukrainian Canal. It was decided that Kakhovka and Melitopol' will become industrial and communication centers. The present Kakhovka, which is 10 kilometers above the proposed dam, will be developed further, and the new Kakhovka will be built 2 kilometers below the dam. Zaporozh'ye, M[illegible]opol', Bol'shoy Tokmak, and the Oktyabr'skoye village will be developed considerably. (85)

In Kakhovka, 100 prefabricated houses were erected and ready for occupation on 10 August. The multistoried stone buildings in the center of the city were still under construction. (74) In Kluchevaya, 72 houses are ready for occupation and many more are under construction. It is expected that 187 one-storied, 13 two-storied, and 14 three-storied houses and other buildings, including a hospital, will be completed by the end of 1951. (86) All in all, 85,000 square meters of housing is planned to be built within 2-3 years, of which 24,000 square meters will be completed in 1951. (83)

During the first 7 months of 1951, the construction materials industry of Zaporozh'ye Oblast delivered to the construction site 3.5 million bricks, 1,300 cubic meters of concrete blocks, 5,500 cubic meters of stones, and other materials. (84) Of the auxiliary enterprises, a concrete-mixing plant near the future dam was nearing completion in August, (74) and a steam-electric power station of 1,100-kilowatt capacity has been assembled and installed near the Kazatskiy village. (87) The Krivoy Rog-Kakhovka high-voltage transmission line, including the section across the Dnepr will be completed by 5 December 1951. (74)

Materials and equipment for the construction of the GES will be delivered to the site mainly by river boats. Consequently, a large dock, well-equipped for mechanized loading and unloading, is under construction near Kakhovka. It is planned to keep the navigation between Kakhovka and Kherson open throughout the winter by employing icebreakers. (88) Construction of a railroad line between Kakhovka and the railroad station [name not given] is nearing completion, and the first train in Kakhovka is expected in December. (89)

"Dneprostroy" is entrusted with the task of building the Kakhovka GES. The backbone of the personnel now on the construction sites consists of "Dneprostroy" personnel to which engineers, technicians, and workmen were added, partly from other constructions and partly from kolkhozes of the Ukraine. Over 4,000 persons are on the job (83) [over 5,000 persons according to source 90]. Measures have been taken to create necessary cadres and as a result, 600 skilled workers will graduate from the training combine during 1952. (90) Moreover, the Odessa Hydraulic Engineering Institute will open a branch in Kakhovka this fall. (74) Socialist competition among the workers is being developed by the party organizations. (86)

South Ukrainian and North Crimean Canals

On the approaching anniversary of the announcement of the construction of the South Ukrainian and North Crimean Canals, A. E. Bochkin, chief of Ukrvodstroy stated that the project requires 800 million cubic meters of earthen work, over 2.5 million cubic meters of concrete, and over 1,000 large and 50,000 smaller structures, including 1,500 bridges and 20 dams. (91) The total length of all the irrigation canals will exceed 45,000 [illegible]meters. Over one million square meters of housing have to be built within a few years

along these canals to house the vast number of construction workers (92), about 20,000 square meters of which will have to be completed during 1951. (93) It is planned that 97 percent of all the work will be mechanized. (91)

Construction activities on the first section of the South Ukrainian Canal between the reservoir of the Dneproges and the city of Melitopol' are confined to building sheds, warehouses, concrete-mixing plants, roads, and railroad sidings. Machines and equipment are arriving from all over the USSR. Houses are under construction in the Village imeni Dmitrova (94), Zaporozh'ye, Melitopol', Vasil'yevka, Snigirevka, and Dzhankoy. A 10-kilometer-long highway connecting the construction site of the Molochnaya River with a railroad line [name not given], is nearing completion, and another road between Shigirevka railroad station and the construction site is under construction. Measures are being taken to train a large number of engineers and skilled workers during 1951. (9)

The Ukrainian State City Planning Institute is preparing plans for cities and buildings, and the "Giprograzhdanskpromstroy," for industrial enterprises. However, their work is not progressing satisfactorily as many errors are made by both organizations.

Surveying has been in progress since the end of 1950. Geological and topographical surveys which are being carried out by the "Ukrgiprovodkhlopok" Institute in cooperation with other 20 research organizations are progressing very slowly (92), although the most important points of the project have already been surveyed. (91) So far, the following surveys have been completed: geological surveys on the 300,000 square kilometers of the North Crimean Canal site and topographical surveys extending for 170 kilometers (95), surveys on the proposed North Crimean Canal site between Askaniya-Nova and the reservoir on the Chatyrlyk River (96), and surveys of the proposed Molochnenskoye reservoir on the South Ukrainian Canal, together with 650,000 square kilometers of the canal's area. (97)

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